USING TELESEISMIC TRAVEL TIME CALIBRATIONS BASED ON A 3D EARTH MODEL TO IMPROVE SEISMIC EVENT LOCATION

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The bulk of worldwide seismic event locations depend upon teleseismic arrivals. Currently, the travel time corrections applied to these arrivals are uncalibrated, i.e., variations of lateral variation of velocities are not accounted for. In this study, we have developed a set of teleseismic P- and S-wave corrections (SSSCs), with respect to IASPEI91, based on a large-scale mantle tomographic model. The SSSCs can be used in conjunction with regional phase calibrations we developed recently (McLaughlin *et al.*, this conference). These corrections include associated model errors. We use the 3-D mantle model SP12 that consists of the global model S12WM13 (Su et al., 1995) for the mantle and CRUST5.1 (Mooney et al., 1998) for the crust. The predicted travel times are computed using a teleseismic raytracer at distances between 25º and 97º in a $2º \times 2º$ latitude and longitude grid for a source depth of 10 km.

To test, validate and quantify location improvements from 3D Earth models, we have developed a new reference event dataset. The test data set includes over 1000 events, mostly with hypocentral location accuracies better than 5 km, and located in the Mediterranean, North Africa, Western Europe and Northern Eurasia. Event relocation testing is conducted using teleseismic calibrations only, regional and teleseismic calibrations, calibrated regionals only, and without calibration. Results obtained with 3-D calibrations are compared with those without calibration to assess improvement on location accuracy and uncertainties. Preliminary tests show that the teleseismic calibrations can be used to improve event locations, and further development on model and model errors will enhance the effect of this technique.

Group-2 Location Calibration Consortium web site: http://g2calibration.cmr.gov